Adherence to Chronic Medication Therapy Associated with 90-day Supplies Compared to 30-day Supplies

Matthew Hermes, PharmD[1]; Patrick P. Gleason, PharmD, FCCP, BCPS[2,3]; Catherine I. Starner, PharmD, CGP, BCPS[2,3] [1]Blue Cross and Blue Shield of Illinois, Chicago, IL; [2]Prime Therapeutics LLC, Eagan, MN; [3]University of Minnesota, Minneapolis, MN

No external funding provided for this research

Background

- Health services research studies have demonstrated a correlation between medical adherence and reductions in complications and hospitalization rates among individuals with diabetes, hypertension and hypercholesterolemia.[1-3] Unfortunately, only about half of the patients in the United States, on average, take their medicines as directed by their doctor and pharmacist.[4]
- In 2010, research by Kaiser Permanente Northern California found individuals filling 90-day supplies of oral diabetes medication via the mail had higher adherence rates than individuals filling 90-day supplies at a retail pharmacy.[5]
- In 2007, a study showed patients receiving 90-day supplies of chronic medications through the mail had significantly higher adherence rates compared to buying 30-day supplies at their local pharmacy during a 270-day follow-up. The authors believed the convenient reordering process, refill reminders and the need for less frequent reordering all contributed to improved adherence.[6]
- A limitation of the 2007 study was a follow-up period of less than 1 year and individuals filling 90-day supplies were required to use mail pharmacy after two initial 30-day supply chronic medication prescriptions at a local pharmacy. This group was compared to a population that did not have a 90-day supply option via their local pharmacy or mail.[5]

Objective

- Using a population that was not required to fill their prescriptions via mail order, we compared adherence within three chronic medication classes (diabetes, hypertension and cholesterol lowering) within two groups: those filling 90-day supplies via their local pharmacy or mail compared to those filling 30-day supplies via their local pharmacy with a 270-day follow-up and a 540-day follow-up.

1305 Corporate Center Drive, Eagan, MN 55121
Patrick Gleason, 612.777.5190
AMCP, April 9, 2010 San Diego, CA, USA

Methods

- This analysis used eligibility and pharmacy claims data from 1,848,991 commercially insured members in January 2007, 1,270,623 members were continuously enrolled during the entire year of 2007 and did not have a mandatory mail requirement, these members were available for the 270-day follow-up analysis. The 540-day follow-up analysis included 905,736 members who were continuously enrolled from January 1, 2007 through June 30, 2008.
- Members with a claim for a chronic prescription for a cholesterol lowering drug (GPI beginning with 39 or 409925), antihypertensive drug (GPI beginning 33, 34, 36, or 37) or oral diabetes drug (GPI 2720, 2723, 2725, 2728, 2740, 2750, 2755, 2760, or 2799) in the 1Q2007 were identified.
- This study used a quasi-experimental parallel group research design. Patients filling a medication in any one of the three chronic drug therapy classes in 1Q2007 (index window) were followed for 270 days from the first claim and a subpopulation were followed for 540 days. Members were not required to have filled 90-day or 30-day supply prescriptions exclusively, however, they were required to have their initial and final claims for their chronic drug be the same days supply.
- Additional inclusion criteria required that members be 18 years of age or older as of January 1, 2007.
- To increase the comparability between the 90-day supply and 30-day supply groups, those in the 30-day supply group were required to have at least a cumulative 90-days supply during the follow-up period for any one of the chronic therapy classes.
- Adherence was measured using the proportion of days covered (PDC) for the three therapy classes.
- The primary outcome assessed was the proportion of members with an average PDC ≥ 80%. The PDC calculation assesses each day during the follow-up period to identify if there was a supply of any drug within the drug class. Drug supply was identified using date of prescription fill and the days supply entered by the pharmacist. The average of PDC values were calculated for the group using each individual's PDC.[7]
- Descriptive and multivariate logistics were used to estimate the relationship between 90-day supply compared to the 30-day supply (reference group) and adherence (PDC ≥ 80%) controlling for member characteristics, current or new initiator (defined as no therapy in the 180-days prior to the index claim), total number of different therapy subclasses within the therapy class and initial therapy drug class claim as a generic.

Results

270-day Follow-Up (Tables 1 and 3)

- Within each chronic medication class, members in the 30-day supply group tended to be slightly older, female, new to therapy and have slightly more claims filled with a generic compared to the 90-day supply group.
- Unadjusted mean PDC adherence rates were significantly higher by 2.8 to 4.2 percentage points ($p<0.001$) across all three chronic medication classes within the 90-day supply group.
- Unadjusted PDC ≥ 80% adherence rates across all three chronic medication classes was significantly higher by 6.4 to 9.7 percentage points within the 90-day supply group ($p<0.001$).
- As shown in **Table 3**, the multivariate model adjusting for member characteristics, new user status, number of different subclasses utilized and generic medication utilization found significantly lower rates of non-adherence ($p<0.001$) for 90-day supply groups, odd ratios (95% confidence intervals) of 0.57 (0.54–0.60) cholesterol lowering, 0.58 (0.55–0.61) hypertension and 0.55 (0.49–0.62) diabetes medications.

540-day Follow-Up (Tables 2 and 4)

- Within each chronic medication class, members in the 30-day supply group tended to be slightly older, female and have slightly more claims filled with a generic compared to the 90-day supply group.
- Unadjusted mean PDC adherence rates were significantly higher by 2.8 to 4.5 percentage points ($p<0.001$) across all three chronic medication classes within the 90-day supply group.
- Unadjusted PDC ≥ 80% adherence rates across all three chronic medication classes was significantly higher by 7.1 to 9.9 percentage points within the 90-day supply group ($p<0.001$).
- As shown in **Table 4**, the multivariate model adjusting for member characteristics, new user status, number of different subclasses utilized and generic medication utilization found significantly lower rates of non-adherence ($p<0.001$) for 90-day supply groups, odd ratios (95% confidence intervals) of 0.60 (0.57–0.64) cholesterol lowering, 0.60 (0.56–0.63) hypertension and 0.61 (0.53–0.70) diabetes medications.

Table 1. 270-day Follow-Up Member Characteristics and Proportion Days Covered (PDC) Adherence Rates

	Cholesterol Lowering		Hypertension		Diabetes	
	30-day Supply	90-day Supply	30-day Supply	90-day Supply	30-day Supply	90-day Supply
Members	51,457	11,821	86,749	15,828	15,111	2,700
Age, Mean (SD)	56.5 (10.3)	56.1 (8.8)	56.9 (12.3)	55.8 (9.7)	56.2 (11.7)	55.7 (9.6)
Female, %	41.5%	40.2%	50.1%	48.1%	44.8%	40.8%
New to Therapy, %	8.3%	8.3%	5.8%	5.1%	7.0%	6.9%
Initial Claim was a Generic, %	28.5%	27.3%	84.0%	81.1%	60.9%	57.0%
Total Number of Unique Therapy Subclasses Utilized, Mean (SD)	1.3 (0.6)	1.3 (0.5)	1.8 (1.2)	1.7 (1.0)	1.8 (0.9)	1.8 (0.9)
PDC ≥ 80%	70.9%	80.6%*	81.1%	87.5%*	74.0%	83.3%*
PDC, Mean (SD)	83.7% (17.2)	87.9%* (15.8)	88.5% (15.4)	91.3%* (13.7)	85.4% (17.3)	89.6%* (15.8)

SD = standard deviation, PDC ≥ 80% = percent of population with a PDC ≥ 80% *p<0.001 compared to 30-day supply population

Table 2. 540-day Follow-Up Member Characteristics and Proportion Days Covered (PDC) Adherence Rates

	Cholesterol Lowering		Hypertension		Diabetes	
	30-day Supply	90-day Supply	30-day Supply	90-day Supply	30-day Supply	90-day Supply
Members	31,982	7,219	53,192	9,405	8,844	1,578
Age, Mean (SD)	56.8 (10.6)	55.7 (8.7)	57.5 (12.6)	55.5 (9.4)	56.6 (11.9)	55.7 (9.5)
Female, %	41.6%	39.9%	50.4%	48.5%	44.9%	41.7%
New to Therapy, %	8.0%	8.0%	5.6%	5.1%	7.1%	7.4%
Initial Claim was a Generic, %	32.1%	31.3%	85.6%	84.8%	61.2%	55.4%
Total Number of Unique Therapy Subclasses Utilized, Mean (SD)	1.4 (0.7)	1.4 (0.7)	2.0 (1.9)	1.9 (1.1)	2.0 (1.1)	2.0 (1.1)
PDC ≥ 80%	65.1%	75.0%*	77.2%	84.3%*	68.9%	77.4%*
PDC, Mean (SD)	79.5% (21.0)	84.0%* (18.3)	85.6% (19.1)	88.4%* (17.0)	81.7% (21.1)	85.7% (19.6)

SD = standard deviation, PDC ≥ 80% = percent of population with a PDC ≥ 80% *p<0.001 compared to 30-day supply population

Table 3. 270-day Follow-Up Logistic Regression Multivariate Model of Non-Adherence (PDC<80%)

	Cholesterol Lowering		Hypertension		Diabetes	
	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval
Age	0.98	0.98–0.98	0.99	0.99–0.99	0.97	0.97–0.98
Female	1.07	1.03–1.11	1.05	1.02–1.09	1.18	1.09–1.26
New to Therapy	2.60	2.45–2.76	2.96	2.80–3.13	2.23	1.97–2.52
Initial Claim was a Generic	1.02	0.98–1.07	1.01	0.97–1.06	0.92	0.83–1.02
Total Number of Unique Therapy Subclasses Utilized	0.56	0.53–0.58	0.49	0.47–0.50	0.44	0.42–0.47
90-day Supply (Reference 30-day Supply)	0.57	0.54–0.60	0.58	0.55–0.61	0.55	0.49–0.62

Logistic Regression Models Max-rescaled R-Squared for each model was 0.064 cholesterol lowering, 0.103 hypertension and 0.132 diabetes.
C-statistic was 0.634 for cholesterol lowering, 0.686 for hypertension and 0.697 for diabetes indicating weak to fair predictive value.

Table 4. 540-day Follow-Up Logistic Regression Multivariate Model of Non-Adherence (PDC<80%)

	Cholesterol Lowering		Hypertension		Diabetes	
	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval
Age	0.98	0.98–0.99	1.00	1.00–1.00	0.98	0.97–0.98
Female	1.13	1.08–1.18	1.07	1.03–1.11	1.21	1.11–1.32
New to Therapy	2.67	2.47–2.88	3.33	3.10–3.57	2.15	1.84–2.52
Initial Claim was a Generic	0.99	0.94–1.04	0.96	0.90–1.01	0.76	0.67–0.86
Total Number of Unique Therapy Subclasses Utilized	0.53	0.50–0.56	0.51	0.49–0.52	0.44	0.41–0.47
90-day Supply (Reference 30-day Supply)	0.60	0.57–0.64	0.60	0.56–0.63	0.61	0.53–0.70

Logistic Regression Models Max-rescaled R-Squared for each model was 0.063 cholesterol lowering, 0.012 hypertension and 0.132 diabetes.
C-statistic was 0.626 for cholesterol lowering, 0.672 for hypertension and 0.691 for diabetes indicating weak to fair predictive value.

Limitations

- This study does not allow for determination of cause and effect. There are many reasons for an individual to become non-adherent to therapy and the process of filling a prescription is just one potential adherence barrier.
- This study is potentially biased as members self selected their use of 90-day supplies and they may be inherently different than members who select 30-day supplies.
- Pharmacy claims data are intended for administrative and payment information purposes and as such they may represent information that is incomplete or inaccurate for performance of health services research. Our analysis assumes that the day supply as entered by the pharmacist on the record is accurate and the member consumed the medication.
- Our pharmacy data are limited to a specific geographical region in the Midwest and may not be generalized to Medicare or Medicaid populations or other geographical regions.

Conclusions

- Members filling their cholesterol lowering, hypertension and diabetes medication with 90-day supplies had unadjusted statistically significantly higher adherence, as calculated by the PDC method, at 270-days follow-up and this significantly higher adherence persisted at 540-days follow-up suggesting that the 90-day supply associated gain in adherence was durable over time.
- Adjusting for the slight differences between the 90-day and 30-day groups using multivariate logistic regression, non adherence was found to be 40% less likely among members utilizing 90-day supplies compared to 30-day supplies at 540-days follow-up.
- These findings suggest 90-day supplies improve adherence for cholesterol lowering, hypertension and oral diabetes agents that may result in improved patient care. Randomized controlled clinical trials are required to quantify the patient care impact and confirm these findings.

References

1. Sokol MC, et al. Impact of medication adherence on hospitalization risk and health care cost. Med Care 2005;43:521–30.
2. Lau DT, et al. Oral antihyperglycemic medication nonadherence and subsequent hospitalization among individuals with type 2 diabetes. Diabetes Care 2004;27:2149–53.
3. Gehi AK, et al. Self-reported medication adherence and cardiovascular events in patients with stable coronary heart disease: the heart and soul study. Arch Intern Med 2007;167:1798–803.
4. Vermeire E, et al. Patient adherence to treatment: three decades of research: a comprehensive review. J Clin Pharm Ther 2001;26:331–42.
5. Duru OK, et al. Mail-order pharmacy use and adherence to diabetes-related medications. Am J Manag Care 2010;16:33–40.
6. Cox E, et al. Is Compliance Really Better in Home Delivery? Evidence Across Three Chronic Therapy Classes. September 2008. Published on line at http://www.express-scripts.com/industryresearch/outcomes/onlinepublications/study/homeDeliveryCompliance.pdf.
7. Sikka S, et al. Estimating Medication Persistency Using Administrative Claims Data. Am J Manag Care 2005;11:449–457.